

DATA MANAGEMENT PLAN

1. GENERAL INFORMATION

This Data Management Plan (DMP) was created on January 16, 2014 for submission to the National Science Foundation as required by NSF guidelines. The purpose of this DMP is to ensure the preservation of the data collected during the proposed research using the proposed laser ablation inductively coupled plasma mass spectrometer at Northeastern University. In addition to serving as the DMP for this proposal, a modified form of this plan would also be provided to and reviewed by all future users of the proposed instrumentation as part of their mandatory instrument training.

2. PROJECT INFORMATION

This Data Management Plan (DMP) covers data that will be collected for the projects described in this proposal, using the proposed instrumentation. This instrumentation would support research in the areas of global climate change, ocean acidification, CO₂-sequestration, paleoceanography, geological dating, marine ecology, biomineralization, materials synthesis, drug discovery, and toxicology. The proposed instrumentation would be used by researchers (faculty, staff, postdocs, students) from Northeastern University, and from other institutions, to measure elemental and isotopic ratios within a broad range of liquid and solid samples, including seawater, groundwater, wastewater, bodily fluids, aerosols, biofilms, bacteria, tissue, cartilage, bone, fossils, rocks, and sediments.

3. DATA RECORDING, STORAGE, BACK-UP, AND SECURITY

All analytical activity, maintenance, and repair will be logged in designated high-quality laboratory notebooks that will be digitized, entered into spreadsheets, and archived on laboratory data drives and automatically backed-up daily on both external university servers and through offsite third-party servers (e.g., *Google Drive*). Laboratory notebooks will also be permanently stored in secure cabinets at Northeastern. Northeastern University's experience with and commitment to secure data archiving is well established and is in keeping with the University's Information Security Policies (http://www.northeastern.edu/securenu/?page_id=128). This includes storage of the primary data drives in secure cabinets and password protection of these drives.

4. ACCESS, SHARING AND RE-USE OF DATA

Pursuant to the NSF Award & Administration Guide (AAG) Chapter VI.D.4., the investigators would encourage and facilitate sharing with other researchers, at no more than incremental cost and within a reasonable time following publication of the research, the primary data, samples, physical collections and other supporting materials created or gathered in the course of the proposed research. The data collector, creator or principal investigator shall have rights to first use of the data. There should be no additional restrictions or permissions required for accessing the data once the research has been published. Privileged or confidential information would be released only in a form that protects the privacy of individuals and subjects involved. The researchers associated with this study are not aware of any reasons that might prohibit the sharing and re-use of the data once it has been published.

Data obtained through the proposed projects would be archived and made openly available to the public through one or more online data repositories appropriate to the specific field of research. Climate change and oceanographic data would be archived with the NSF-sponsored US Ocean Carbon and Biogeochemistry Data Management Office (<http://ocb.whoi.edu/>), the European Project on Ocean Acidification Observation Data Management System (EPOCA; <http://www.epoca-project.eu/index.php/What-do-we-do/Science/Data/Data-policy.html>), the World Data Center for Marine Environmental Sciences (<http://www.wdc-mare.org/>), the Publishing Network for Geoscientific and Environmental Data (PANGAEA; <http://doi.pangaea.de/>), the NSF-funded Biological and Chemical Oceanography Data Management Office (BCO-DMO; <http://www.bco-dmo.org/>), the Atlantic Oceanographic and Meteorological Laboratory (AOML) Environmental Data Server (<http://www.aoml.noaa.gov/envids/index.php>), the Carbon Dioxide Information Analysis Center

(CDIAC; <http://cdiac.esd.ornl.gov/home.html>), the Ocean Biogeographic Information System (OBIS; <http://iobis.org/>), and the Woods Hole Oceanographic Institute Data Center (<http://www.whoi.edu/page.do?pid=7140>). Geological, paleoceanographic, paleoclimatic, sedimentological, and paleobiological data would be archived through the NSF-funded EarthTime (<http://earth-time.org/>), the NOAA Paleoclimatology Program data repository administered by the National Climatic Data Center (<http://www.ncdc.noaa.gov/paleo/>), CHRONOS (<http://www.chronos.org/>), the Paleobiology Database (<http://paleodb.org/cgi-bin/bridge.pl>), Publishing Network for Geoscientific and Environmental Data (PANGAEA; <http://www.pangaea.de/>), and EarthChem (<http://www.earthchem.org/>). Ecological data would be archived through the Global Biodiversity Information Facility (<http://www.gbif.org/>) and the National Ecological Observatory Network (NEON; <http://www.neoninc.org/>).

5. PUBLICATION OF DATA

Pursuant to the NSF Award & Administration Guide (AAG) Chapter VI.D.4., the investigators performing the proposed research would, in a timely manner, prepare and submit for publication all significant findings that result from this research. Authorship of the resulting publications would reflect the relative contributions of those involved. Publication would occur primarily through peer-reviewed journals, but also through non-peer reviewed articles, government reports, the investigators' professional webpages, and through presentations at international meetings, workshops, universities, and research centers. The investigators would also communicate the findings through public outreach activities, including presentations to local K-12 audiences, continuing education programs, community colleges, and state and federal legislatures.

6. DATA QUALITY CONTROL

Certified or inter-laboratory calibrated standards that are matrix-matched to the investigated material would be used for all quantitative analyses. A maximum of 10 analyses would be bracketed by duplicate analyses of the appropriate certified standards along with procedural blanks. Samples would always be analyzed in duplicate, and in triplicate when possible. As a further measure to control analytical quality, randomly selected samples would be run as blind replicates within single sessions and also across different analytical sessions. Designated unknown materials would also be analyzed throughout the life of the instrument in order to assess long term changes in the instrument's performance.

7. PRESERVATION AND LONG-TERM MANAGEMENT OF DATA

All data collected on the proposed instrumentation (including scanned copies of the laboratory notebooks) would be permanently archived on data drives at Northeastern and backed-up on secure University and third-party servers as described above. The investigators are aware of no specific financial considerations that would impact the long-term management and preservation of these data. The PI and archival staff at Northeastern would review this DMP annually to ensure that data management protocols are up-to-date and compliant with university, state and federal policies.

8. LEGAL GUIDELINES AND REQUIREMENTS

The investigators are not aware of any sensitive data, including personal identifiers, which would be collected through the proposed research. The investigators are also not aware of any copyright or licensing issues associated with the data to be generated from the proposed research.